

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
14 June 2001 (14.06.2001)

PCT

(10) International Publication Number
WO 01/42425 A3

- (51) International Patent Classification⁷: A01N 63/00. A61K 48/00, 35/42, C12N 5/08
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- (21) International Application Number: PCT/US00/42646
- (22) International Filing Date: 7 December 2000 (07.12.2000)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
60/169,545 7 December 1999 (07.12.1999) US
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- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.
- (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).
- Published:
— with international search report
- (88) Date of publication of the international search report:
10 May 2002
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: LUNG STEM CELLS AND LUNG REGENERATION

(57) Abstract: A method of stimulating the growth of lung alveolar surface in a lung comprises providing progenitor or stem cells capable of regenerating lung alveolar surface, and then administering the progenitor or stem cells to the lung in an amount sufficient to stimulate the growth of lung alveolar surface therein.

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INTERNATIONAL SEARCH REPORT

International application No.
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A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : A01N 63/00; A61K 48/00; 35/42; C12N 5/08

US CL : 424/93.21, 557; 435/372; 514/44

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 424/93.21, 557; 435/372; 514/44

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Please See Extra Sheet.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WARBURTON ET AL. Commitment and Differentiation of Lung Cell Lineages. Biochem. Cell Bio. 1998. Vol. 76. pages 971-995.	1-12
A	ZEPEDA ET AL. Characterization of Stem Cells in Human Airway Capable of Reconstituting a Fully Differentiated Epithelium. Somatic Cell and Molecular Genetics. 1995. Vol. 21, No. 1. pages 61-73.	1-12
A	OTTO ET AL. Lung Stem Cells. Int J. Exp. Pathol. October 1997. Vol. 78. No. 5. pages 291-310.	1-12
A	SHAABAN ET AL. Fetal hematopoietic Stem Cell Transplantation. Seminars in Perinatology. December 1999. Vol 23. No. 6. pages 515-23.	1-12

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
A document defining the general state of the art which is not considered to be of particular relevance	*X* document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
E earlier document published on or after the international filing date	*Y* document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	*Z* document member of the same patent family
O document referring to an oral disclosure, use, exhibition or other means	
P document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

24 MAY 2001

Date of mailing of the international search report

22 JUN 2001

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INTERNATIONAL SEARCH REPORT

International application No.
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Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

Please See Extra Sheet.

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
☒ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.
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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CHAPELIER ET AL. Gene Therapy in Lung Transplantation: Feasibility of Ex Vivo Adenovirus-Mediated Gene Transfer to the Graft. Human Gene Therapy. 1 October 1996. Vol. 7. pages 1837-1845.	1, 3-12
A	US 5,859,068 (WILSON) 12 January 1999, see whole document.	1-12

INTERNATIONAL SEARCH REPORT

International application No.
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B. FIELDS SEARCHED

Electronic data bases consulted (Name of data base and where practicable terms used):

STN, WEST 2.0, EMBASE, MEDLINE, SCISEARCH, JAPIO, EUROPATUFL, USPATFULL, BIOSIS
search terms: lung regeneration, stem cells, lung alveolar surface, gene therapy, warburton, buckley, schwarz, alveolar cells, lung stem cells, lung cell lineages, lung epithelium, lung transplant, ex vivo gene therapy, in vivo gene therapy, stem cell transplantation

BOX II. OBSERVATIONS WHERE UNITY OF INVENTION WAS LACKING

This ISA found multiple inventions as follows:

This application contains the following inventions or groups of inventions which are not so linked as to form a single inventive concept under PCT Rule 13.1. In order for all inventions to be searched, the appropriate additional search fees must be paid.

Groups I, claim(s) 1-2 and 4-12, drawn to a method of stimulating growth of lung alveolar surface in a lung, wherein the lung is in vivo in a subject.

Group II, claim(s) 1 and 3, drawn to a method of stimulating growth of lung alveolar surface in a lung, wherein the lung is ex vivo and transplanting said lung into recipient.

The inventions listed as Groups I and II do not relate to a single inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

The special technical feature of Group I is considered to be an in vivo method of gene therapy for stimulating the growth of lung alveolar surface.

The special technical feature of Group II is considered to be ex vivo method of gene therapy for stimulating the growth of lung alveolar surface and transplanting said lung into a recipient.

Accordingly Groups I-II are not so linked by the same or a corresponding special technical feature as to form a single general inventive concept.

The inventions listed as Groups I-II do not relate to a single inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the reasons set forth above.

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